

# Aaron Zoll

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## EDUCATION

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<b>Johns Hopkins, Graduate — Ph.D in Applied Mathematics</b>	August 2023 – Present
<b>Johns Hopkins, Graduate — M.S in Applied Mathematics</b>	August 2022 – May 2023
<b>Johns Hopkins, Undergraduate — B.S in Applied Mathematics</b>	August 2019 – May 2022
<b>Johns Hopkins, Undergraduate — B.A in Mathematics</b>	August 2019 – May 2022

## TEACHING EXPERIENCE

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**Johns Hopkins, Baltimore — Teaching Assistant** January 2020 – Present

Supported instruction in twenty undergraduate and graduate-level courses through grading, writing lecture notes, designing assignments, leading weekly discussion sections, and providing academic support to students. Collaborated with faculty to reinforce core course concepts and foster a strong learning environment.

**Johns Hopkins, Baltimore — Course Developer** Summer 2021 – 2025

Contributed to the design and development of new mathematics and engineering courses. Authored original lecture material, guided Excel practice problems, engaging problem sets, and instructional resources tailored to enhance pedagogical clarity and student engagement.

**Johns Hopkins, Baltimore — MSE Orientation Review Session** August 2023/2024

Designed and led a series of review sessions for the incoming 120 masters students, covering foundational concepts in linear algebra and matrix analysis. Developed comprehensive lecture notes and facilitated interactive discussions to prepare students for rigorous graduate coursework.

**Mathnasium, Baltimore — Math Instructor** August 2019 – December 2019

Tutored dozens of students ages 6 to 18 in fundamental math topics ranging from multiplication tables to AP calculus. Adapted instruction to individual learning styles, promoting confidence and mastery in mathematical skills.

## COURSE DEVELOPMENT

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**College Algebra (AS.110.102) — Complete** Summer 2021

*Course Developer, Johns Hopkins University*

Collaborated with the Director of Online Programs to develop a comprehensive College Algebra course aimed at preparing incoming students for success in higher-level mathematics. Designed instructional content to reinforce key algebraic concepts through accessible and engaging materials.

**Data Analysis Workshop (AS.110.100) — Complete** Summer 2023–2025

*Course Developer & Instructor, Johns Hopkins University*

Developed and launched a summer course for high school students introducing the fundamentals of data analysis, probability, and statistics. Encouraged students to master affective presentation skills and collaborative work. Produced a full suite of materials, including lecture videos, online quizzes, interactive assignments, and guided Excel tutorials, delivered to over 50 students annually.

## TEACHING ASSISTANT

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## Graduate Teaching Assistant

Introduction to Computational Mathematics (EN.553.385)	Spring 2025, Spring 2026
Machine Learning 1 (EN.553.740)	Fall 2025
Introduction to Convexity (EN.553.665)	Fall 2024, Spring 2024
Matrix Analysis and Linear Algebra (EN.553.792)	Fall 2023
Mathematical Game Theory (EN.553.653)	Spring 2023
Mathematical Modeling and Consulting (EN.553.400)	Spring 2023
Optimization in Finance (EN.553.661)	Fall 2022

## Undergraduate Teaching Assistant

Real Analysis I (EN.553.405)	Spring 2022, Summer 2022
Cryptology and Coding (EN.553.371)	Spring 2022
Calculus II (For Biological and Social Science) (AS.110.107)	Spring 2022
Honors Discrete Mathematics (EN.553.172)	Fall 2021
Differential Equations and Applications (AS.110.302)	Fall 2021, Spring 2021
Discrete Mathematics (EN.553.171)	Spring 2021, Fall 2020
Calculus III (AS.110.202)	Fall 2020
Introduction to Computing (AS.205.205)	Spring 2020

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## RESEARCH

### Optimization Research

Ongoing

*Dissertation research with Dr. Benjamin Grimmer, Johns Hopkins University*

Conducting theoretical research on algorithm design and analysis to unify the regimes between smooth and nonsmooth convex problem classes (e.g. function exhibiting Hölder smoothness or uniform convexity). Prior work focused on heterogeneously smooth and convex compositions, calculus results expanding and characterizing dual notations between Hölder smoothness and uniform convexity, interpolation theory for inexactly smooth convex functions, performance estimation over respective problem classes, and universal algorithm design. Future work entails characterizing the class of minimax optimal methods for convex Lipschitz minimization.

### Signal Processing Research

Upcoming

*Planned collaboration with Dr. Mario Michelli & Kaleigh Rudge, Johns Hopkins University*

Preparing to investigate spectral properties of the Discrete Fourier Transform and its connections to signal representation and harmonic analysis. Further investigation will include advancing understanding of the Fractional Fourier Transform, smoothly interpolating between the signal and frequency domains.

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## PUBLICATIONS

### Accepted Papers

A Universally Optimal Primal-Dual Method for Minimizing Heterogeneous Compositions

*Aaron Zoll, Benjamin Grimmer*

*IMA Journal of Numerical Analysis, 2025*

arXiv:2503.07566

### Preprints

Inexactly Smooth Performance Estimation and New Optimized Gradient Methods

*Aaron Zoll, Benjamin Grimmer*

2026

arXiv:2606.01505

## TALKS

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### On Interpolation Theory

Applied Mathematics and Statistics Student Seminar, *Johns Hopkins* Mar, 2026  
*Algebra and Number Theory* Guest Lecture, *Clayton High School* Apr, 2026

### On Inexactly Smooth Performance Estimation

Applied Mathematics and Statistics Student Seminar, *Johns Hopkins* Sept, 2025  
INFORMS Annual Meeting, *Atlanta, Georgia* Oct, 2025  
Junior MINDS Seminar, Johns Hopkins Mathematical Institute for Data Science Nov, 2025  
Modeling and Optimization: Theory and Applications (MOPTA), *Lehigh University* (*Upcoming*) Aug, 2026

### On Minimizing Heterogeneous Compositions

Applied Mathematics and Statistics Student Seminar, *Johns Hopkins* Mar, 2025  
Junior MINDS Seminar, Johns Hopkins Mathematical Institute for Data Science Apr, 2025  
International Conference on Continuous Optimization (ICCOPT), *Los Angeles, California* Aug, 2025

## AWARDS

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Joel Dean Award for Excellence in Teaching, department of Applied Math and Statistics (2019-2020)  
Joel Dean Award for Excellence in Teaching, department of Mathematics (2019-2020)  
Gordon L. and Beatrice C. Bowles Fellowship (2022-2023)  
Promotion to Teaching Fellow in the Department of Applied Mathematics and Statistics, Johns Hopkins University (2025)

## SKILLS

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Expertise in mathematical problem-solving, analytical reasoning, and quantitative analysis, with the adept ability to tackle complex challenges.  
Aptitude for delivering clear, engaging presentations and cultivating a dynamic, intellectually stimulating classroom environment.  
Proficiency in Matlab, Python, and Julia, with extensive experience in optimization algorithms and image analysis techniques.

## SOFTWARE

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Matlab · Python · Julia · LaTeX · Desmos · Excel